

Claims:

1. A process for the production of a polyurethane product by reaction of a mixture of

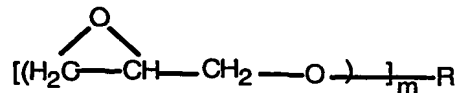
5 (a) at least one liquid organic polyisocyanate with
(b) at least one liquid polyol
(c) in the presence of at least one fusible catalyst,
with a melting point between 35 and 130°C
(d) optionally in the presence of another polyurethane
10 catalyst,
(e) optionally in the presence of a blowing agent; and
(f) optionally additives or auxiliary agents known per
se for the production of polyurethane foams, elastomers
and/or coatings.

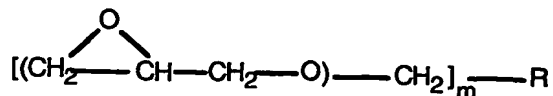
2. The process of Claim 1 wherein the fusible catalyst is the reaction product of an amine having a reactive hydrogen with an epoxide, a lactone or with a dilactone.

20 3. The process of Claim 2 wherein the epoxide is an
aliphatic or cycloaliphatic polyepoxide or glycidyl ether.

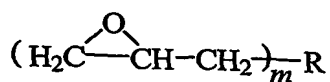
4. The process of Claim 3 wherein the polyepoxide is a diepoxide or triepoxide.

5. The process of Claim 2 wherein the epoxide is represented by one of the formulae





or



wherein R is substituted or unsubstituted aromatic, aliphatic, cycloaliphatic or heterocyclic polyvalent group and n had an average value of from 1 to less than 8 and m is an integer from 1 up to the valence of R.

6. The process of Claim 3 wherein the epoxy contains less than 5 percent by weight chlorine.

7. The process of Claim 2 wherein the lactone has 6 to 20 carbon atoms in the ring.

8. The process of Claim 7 wherein the lactone is selected from epsilon-caprolactone, methylcaprolactone, pentadecalactone, and the dilactone is selected from glycolide or lactide.

9. The process of Claim 1 wherein the amine is represented by the formula $\text{HN}(\text{R}^1)_2$, where each R^1 is independently a compound having 1 to 20 carbon atoms or may be attached together with the nitrogen atom and optionally other hetero atoms and alkyl-substituted hetero atoms to form a saturated or unsaturated heterocyclic ring.

10. The process of Claim 1 wherein the amine is represented by the formula $(\text{H})_x-\text{A}-\text{R}^3-\text{M}-(\text{R}^3)_y$, where A is nitrogen or oxygen; x is 2 when A is nitrogen and 1 when A is oxygen; R^3 at each occurrence is independently a linear or branched alkyl having 1 to 20 carbon atoms; M is an amine or polyamine, linear or cyclic

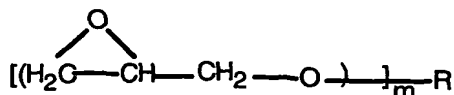
with at least one tertiary amine group; and y is an integer from 0 to 6.

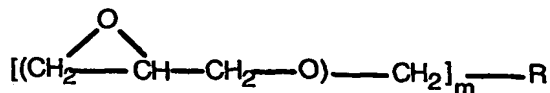
11. The process of Claim 1 wherein the amine is represented by the formula $(H)_d-N-(R^3-M-(R^3)_y)_b$, where N is nitrogen; R^3 at each occurrence is independently a linear or branched alkyl having 1 to 20 carbon atoms; M is an amine or polyamine, linear or cyclic with at least one tertiary amine group; y is an integer from 0 to 6; and b and d are either 1 or 2 such that the sum of b and d is 3.

12. The process of Claim 1 wherein the amine is represented by the formula $(R^4)_e-Y-(R^3-M)_f-(R^3)_y$ or $(R^4)_e-Y-[(R^3-M)-(R^3)_y]_f$ where
 M is an amine or polyamine, linear or cyclic with at least one tertiary amine group;
 R^3 at each occurrence is independently a linear or branched alkyl having 1 to 20 carbon atoms;
 R^4 is hydrogen or a moiety having 1 to 20 carbon atoms, preferably R^4 is an alkyl moiety;
 Y is hydrogen, oxygen or nitrogen,
 y is an integer from 0 to 6;
 e is 0, 1 or 2;
 f is 1 or 2;
 with the provisos that e is zero when Y is hydrogen, e and f are 1 when Y is oxygen, and when Y is nitrogen, e and f can be 1 or 2 such that the sum of e and f is 3.

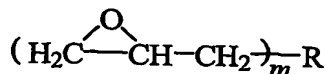
13. A polyurethane product produced by the process of any one of Claims 1 to 12.

14. A polyurethane catalyst comprising the reaction product of amine having a reactive hydrogen with an epoxide wherein the epoxide is selected from one or more compounds of the formulae





or



5

wherein R is substituted or unsubstituted aromatic, aliphatic, cycloaliphatic or heterocyclic polyvalent group and n had an average value of from 1 to less than 8 and m is an integer from 1 up to the valence of R;

10 and the amine is selected from one or more compounds of the formulae

HN(R¹)₂, wherein each R¹ is independently a compound having 1 to 20 carbon atoms or may be attached together with the nitrogen atom and optionally other hetero atoms and alkyl-substituted hetero atoms to form a saturated or unsaturated heterocyclic ring,

15 (H)_x-A-R³-M-(R³)_y A is nitrogen or oxygen; x is 2 when A is nitrogen and 1 when A is oxygen; R³ at each occurrence is independently a linear or branched alkyl having 1 to 20 carbon atoms; M is an amine or polyamine, linear or cyclic with at least one tertiary amine group; and y is an integer from 0 to 6;

20 (H)_d-N-(R³-M-(R³)_y)_b where R³, M and y are as defined above, N is nitrogen; b and d are either 1 or 2 such that the sum of b and d is 3;

(R⁴)_e-Y-(R³-M)_f-(R³)_y or (R⁴)_e-Y-[(R³-M)-(R³)_y]_f where M, R³ and y are as defined above

25 R⁴ is hydrogen or a moiety having 1 to 20 carbon atoms, preferably R⁴ is an alkyl moiety;

Y is hydrogen, oxygen or nitrogen;

e is 0, 1 or 2;

30 f is 1 or 2;

with the provisos that e is zero when Y is hydrogen, e and f are 1 when Y is oxygen, and when Y is nitrogen, e and f can be 1 or 2 such that the sum of e and f is 3.

35 15. A polyurethane catalyst comprising the reaction product of amine having a reactive hydrogen with a lactone or

dilactone wherein the lactone or dilactone has 6 to 20 carbon atoms in the ring and the amine is selected from one or more compounds of the formulae $\text{HN}(\text{R}^1)_2$, wherein each R^1 is independently a compound having 1 to 20 carbon atoms or may be attached together with the nitrogen atom and optionally other hetero atoms and alkyl-substituted hetero atoms to form a saturated or unsaturated heterocyclic ring,

$(\text{H})_x\text{-A-R}^3\text{-M-(R}^3)_y$, where A is nitrogen or oxygen; x is 2 when A is nitrogen and 1 when A is oxygen; R^3 at each occurrence is

independently a linear or branched alkyl having 1 to 20 carbon atoms; M is an amine or polyamine, linear or cyclic with at least one tertiary amine group; and y is an integer from 0 to 6;

$(\text{H})_d\text{-N-(R}^3\text{-M-(R}^3)_y)_b$, where R^3 , M and y are as defined above, N is nitrogen; b and d are either 1 or 2 such that the sum of b and d is 3; or

$(\text{R}^4)_e\text{-Y-(R}^3\text{-M)}_f\text{-(R}^3)_y$ or $(\text{R}^4)_e\text{-Y-[(R}^3\text{-M)-(R}^3)_y]_f$ where M, R^3 and y are as defined above

R^4 is hydrogen or a moiety having 1 to 20 carbon atoms, preferably R^4 is an alkyl moiety;

Y is hydrogen, oxygen or nitrogen;

e is 0, 1 or 2;

f is 1 or 2;

with the provisos that e is zero when Y is hydrogen, e and f are 1 when Y is oxygen, and when Y is nitrogen, e and f can be 1 or 2

such that the sum of e and f is 3.

16. A polyisocyanate terminated polymer produced by the mixing a molar excess of polyisocyanate with a catalyst of Claim 14 or 15.

17. A polyol terminated prepolymer produced by the mixing of a molar excess of a catalyst of Claim 14 or 15 with a polyisocyanate.